CLAIMS

What is claimed is:

1   1.   An apparatus for applying compensation to samples received from an optical channel

2   comprising:

3   an equalizer having an equalizer response spectrally shaping the samples for compensation to

4   generate a sequence of equalized samples;

5   an error generator generating an error for a current sample based on the difference between 1) an

6   equalized current sample and 2) a decision for the current sample adjusted for a target response, wherein

7   the target response is based on a response of the optical channel; and

8   a combiner configured to combine the error with one or more samples to provide an update signal,

9   wherein the equalizer employs the update signal to adjust the equalizer response to the target response.

1   2.   The invention as recited in claim 1, further comprising a maximum likelihood sequence

2   estimation (MLSE) detector, the MLSE detector generating decoded data from the sequence of equalized

3   samples.

1   3.   The invention as recited in claim 2, wherein the MLSE detector generates decoded data

2   with an algorithm having transitions based on the target response.

1   4.   The invention as recited in claim 3, further comprising an accumulator configured to

2   accumulate the square of each error value, wherein the accumulation of the squared error values relates to a

3   parameter of the target response, and the algorithm adjusts its transitions by adaptation of the parameter of

4   the target response.

1   5.   The invention as recited in claim 1, wherein the equalizer comprises a filter defined by a

2   set of filter taps.

1   6.   The invention as recited in claim 5, wherein the set of filter taps are adapted in accordance

2   with a recursive update rule, wherein the update rule is generated from a cost function.

1   7.   The invention as recited in claim 5, wherein the cost function is quadratic error and the

2   update rule is generated from minimizing mean squared error of the cost function with respect to the filter

3   tap.

1   8.   The invention as recited in claim 5, wherein the target response is of the form A+D, where

2   A is a parameter ranging from about 0 to about 1, and D is a unit delay.

1   9.   The invention as recited in claim 1, further comprising an accumulator configured to

2   accumulate the square of each error value, wherein the accumulation of the squared error values relates to a

3   parameter of the target response, and the apparatus adapts the parameter of the target response during

4   initialization of the apparatus.

1   10.   The invention as recited in claim 1, wherein the equalization applied to the current sample

2   accounts for differential group delay of a signal passing through a single mode fiber.

1   11.   The invention as recited in claim 1, wherein the apparatus is embodied in an integrated

2   circuit.

1   12.   The invention as recited in claim 1, wherein the apparatus is implemented in a receiver of

2   an optical communication terminal.

1   13.   A method of applying compensation to samples received from an optical channel

2   comprising the steps of:

3   (a) spectrally shaping, with an equalizer, the samples for compensation to generate a sequence of

4   equalized samples;

5   (b) generating an error for a current sample based on the difference between 1) an equalized

6   current sample and 2) a decision for the current sample adjusted for a target response, wherein the target

7   response is based on a response of the optical channel;

8   (c) combining the error with one or more samples to provide an update signal; and

9   (d) updating the equalizer with the update signal to adjust the equalizer response to the target

10 response.

1   14.   The invention as recited in claim 13, further comprising the step of (e) generating decoded

2   data from the sequence of equalized samples with maximum likelihood sequence estimation (MLSE)

3   detection.

1   15.   The invention as recited in claim 14, wherein step (e) generates decoded data with an

2   algorithm having transitions based on the target response.

1   16.   The invention as recited in claim 15, further comprising the steps of accumulating the

2   square of each error value, wherein the accumulation of the squared error values relates to a parameter of

3   the target response, and adjusting its transitions by adaptation of the parameter of the target response.

1   17.   The invention as recited in claim 13, wherein step (a) comprises the step (a1) of filtering

2   based on a set of filter taps.

1   18.   The invention as recited in claim 17, wherein step (a1) includes the step of adapting the set

2   of filter taps in accordance with a recursive update rule based on a cost function.

1   19.   The invention as recited in claim 18, wherein the cost function is quadratic error and the

2   update rule is generated from minimizing mean squared error of the cost function with respect to the filter

3   tap.

1   20.   The invention as recited in claim 17, wherein, for step (b) the target response is of the form

2   A+D, where A is a parameter ranging from about 0 to about 1, and D is a unit delay.

1   21.   The invention as recited in claim 13, further comprising the steps of: accumulating the

2   square of each error value, wherein the accumulation of the squared error values relates to a parameter of

3   the target response, and adapting the parameter of the target response during initialization of the apparatus.

1   22.   The invention as recited in claim 13, wherein for step (a), the compensation applied to the

2   current sample accounts for differential group delay of a signal passing through a single mode fiber.

1   23.   The invention as recited in claim 13, wherein the method is embodied in a processor of an

2   integrated circuit.

1   24.   The invention as recited in claim 13, wherein the method is embodied in a receiver of an

2   optical communication terminal.

1   25.   A computer-readable medium having stored thereon a plurality of instructions, the plurality

2   of instructions including instructions which, when executed by a processor, cause the processor to

3   implement a method for applying compensation to samples received from an optical channel, the method

4   comprising the steps of:

5   (a) spectrally shaping, with an equalizer, the samples to generate a sequence of equalized samples;

6   (b) generating an error for a current sample based on the difference between 1) an equalized

7   current sample and 2) a decision for the current sample adjusted for a target response, wherein the target

8   response is based on a response of the optical channel;

9   (c) combining the error with one or more samples to provide an update signal for each tap of the

10   equalizer; and

11   (d) updating the equalizer with the update signal to adjust the equalizer response to the target

12   response.